39. $g(x)=0$

$x^2-4x-1=0$

$a=1,\quad b=-4,\quad c=-1$

$$x=\frac{-(-4)\pm\sqrt{(-4)^2-4(1)(-1)}}{2(1)}=\frac{4\pm\sqrt{16+4}}{2}$$

$$=\frac{4\pm\sqrt{20}}{2}=\frac{4\pm2\sqrt{5}}{2}=2\pm\sqrt{5}$$

The zeros of $g(x)=x^2-4x-1$ are $2-\sqrt{5}$ and $2+\sqrt{5}$. The x-intercepts of the graph of g are $2-\sqrt{5}$ and $2+\sqrt{5}$.

#s 39 & 42 Solve by quadratic formula. Zeros? x-intercepts?

4pts **42.** $g(x)=0$

$2x^2+5x+3=0$

$a=2,\quad b=5,\quad c=3$ — 1pt

$$x=\frac{-5\pm\sqrt{5^2-4(2)(3)}}{2(2)}=\frac{-5\pm\sqrt{25-24}}{4}$$

$$x=\frac{-5\pm1}{4}=-1 \text{ or } -\frac{3}{2}$$ — 1pt

Should do b^2-4ac separately, first.

Used the formula 1pt

The zeros of $g(x)=2x^2+5x+3$ are $-\frac{3}{2}$ and -1.

The x-intercepts of the graph of g are $-\frac{3}{2}$ and -1.

Report as $(-\frac{3}{2},0)$ & $(-1,0)$ → 1pt

#s 50, 54 Any Method. Zeros? x-intercepts?

50. $f(x)=0$

$x^2-6=0$

$x^2=6\Rightarrow x=\pm\sqrt{6}$

The zeros of $f(x)=x^2-6$ are $-\sqrt{6}$ and $\sqrt{6}$.

The x-intercepts of the graph of f are $-\sqrt{6}$ and $\sqrt{6}$.

$(\pm\sqrt{6},0)$ is OK

54. $f(x)=0$

23pts + 2pts context

25 TOTAL POINTS

$6x^2+7x-20=0$

$(3x-4)(2x+5)=0$

$3x-4=0$ or $2x+5=0$

$x=\frac{4}{3}$ $\qquad$ $x=-\frac{5}{2}$

The zeros of $f(x)=6x^2+7x-20$ are $-\frac{5}{2}$ and $\frac{4}{3}$.

The x-intercepts of the graph of f are $-\frac{5}{2}$ and $\frac{4}{3}$.

$(-\frac{5}{2},0)$ & $(\frac{4}{3},0)$

Find points of intersection. Solve $f(x)=g(x)$

65. 3pts **65.** $f(x)=g(x)$

$x^2-x+1=2x^2-3x-14$

$0=x^2-2x-15$

$0=(x+3)(x-5)$

$x+3=0$ or $x-5=0$

$x=-3$ $\qquad$ $x=5$ → 1pt

The x-coordinates of the points of intersection are -3 and 5. The y-coordinates are

$f(-3)=(-3)^2-(-3)+1=9+3+1=13$ and

$f(5)=5^2-5+1=25-5+1=21$.

The graphs of the f and g intersect at the points $(-3,13)$ and $(5,21)$.

→ 2pts

67. $P(x)=0$

$x^4-6x^2-16=0$

$(x^2+2)(x^2-8)=0$

$x^2+2=0$ or $x^2-8=0$

$x^2=-2$ $\qquad$ $x^2=8$

$x=\pm\sqrt{-2}$ $\qquad$ $x=\pm\sqrt{8}$

$=$ not real $\qquad$ $=\pm2\sqrt{2}$

The zeros of $P(x)=x^4-6x^2-16$ are $-2\sqrt{2}$ and $2\sqrt{2}$. The x-intercepts of the graph of P are $-2\sqrt{2}$ and $2\sqrt{2}$.

-7

77. 5pts $f(x)=0$

$(3x+4)^2-6(3x+4)+9=0$

Let $u=3x+4 \rightarrow u^2=(3x+4)^2$

$u^2-6u+9=0$ → 2 pts

$(u-3)^2=0$

$u-3=0$

$u=3$ → 1pt

$3x+4=3$

$x=-\frac{1}{3}$ → 1pt

The only zero of $f(x)=(3x+4)^2-6(3x+4)+9$ is $-\frac{1}{3}$. The x-intercept of the graph of f is $-\frac{1}{3}$.

Report as $\left(-\frac{1}{3}, 0\right)$

1pt

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83. $g(x)=0$

$x+\sqrt{x}-20=0$

Let $u=\sqrt{x} \rightarrow u^2=x$

$u^2+u-20=0$

$(u+5)(u-4)=0$

$u+5=0$ or $u-4=0$

$u=-5$ $\quad u=4$

$\sqrt{x}=-5$ $\quad \sqrt{x}=4$

$x=$ not real $\quad x=4^2=16$

Check: $g(16)=16+\sqrt{16}-20=16+4-20=0$

The only zero of $g(x)=x+\sqrt{x}-20$ is 16. The only x-intercept of the graph of g is 16.

~~5pts~~ 90. 5pts

a. To find when the object will be 15 meters above the ground, we solve 1pt

$s=15$

$-4.9t^2+20t=15$ → 1pt

$-4.9t^2+20t-15=0$

$a=-4.9,\ b=20,\ c=-15$

$t=\frac{-20\pm\sqrt{20^2-4(-4.9)(-15)}}{2(-4.9)}$

$=\frac{-20\pm\sqrt{106}}{-9.8}$ → 1pt

$=\frac{20\pm\sqrt{106}}{9.8}$

$t\approx 0.99$ or $t\approx 3.09$ → 1pt → 1pt

The object will be 15 meters above the ground after about 0.99 seconds (on the way up) and about 3.09 seconds (on the way down).

4pts **b.** The object will strike the ground when the distance from the ground is 0. Thus, we solve

$s=0$ → 1pt

$-4.9t^2+20t=0$ → 1pt

$t(-4.9t+20)=0$

$t=0$ or $-4.9t+20=0$

$-4.9t=-20$ → 1pt

$t\approx 4.08$ → 1pt

The object will strike the ground after about 4.08 seconds.

2pts **c.** $s=100$

$-4.9t^2+20t=100$

$-4.9t^2+20t-100=0$

$a=-4.9,\ b=20,\ c=-100$

$t=\frac{-20\pm\sqrt{20^2-4(-4.9)(-100)}}{2(-4.9)}$

$=\frac{-20\pm\sqrt{-1560}}{-9.8}$

$b^2-4ac=-1560 < 0 \Rightarrow$ No Real Solutions.

All you need 2pts

There is no real solution. The object never reaches a height of 100 meters.

1pt