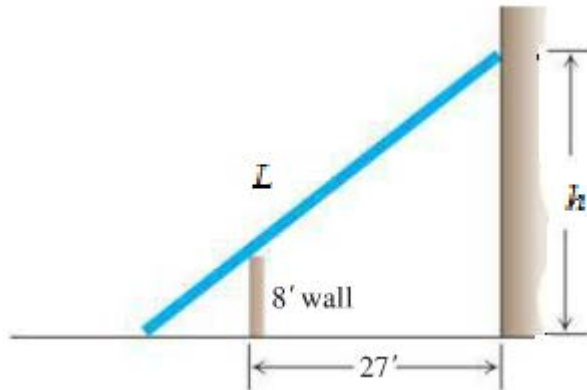


Do your work on separate paper. This sheet is only a cover sheet. Do *not* waste my time writing answers on *this* sheet.

1. (30 pts) The 8-ft wall shown here stands 27 ft from the building. Find the length of the shortest straight beam that will reach to the side of the building from the ground outside the wall. Hint: To minimize length L , minimize L^2 . Let h = the height at which the beam rests against the building. This will involve similar triangles and the Pythagorean Theorem.



2. (40 pts) Sketch the graph of $f(x) = \cos x - \frac{1}{2}x$ on the interval $[0, 2\pi]$.

3. (20 pts) Sketch a smooth connected curve $y = f(x)$ with

$$f(-2) = 8,$$

$$f'(2) = f'(-2) = 0,$$

$$f(0) = 4,$$

$$f'(x) < 0 \text{ for } |x| < 2,$$

$$f(2) = 0,$$

$$f''(x) < 0 \text{ for } x < 0,$$

$$f'(x) > 0 \text{ for } |x| > 2, \quad f''(x) > 0 \text{ for } x > 0.$$

4. Find the first derivatives. Do not simplify.

a. (5 pts) $\frac{3x^2 + 5x + 2}{2x^2 + x - 1}$

b. (5 pts) $(x^2 - 3x)\cos(x^2 - 3x)$

c. (5 pts) $\sec^2(x^2 - 3x)$