Math 182 Exam 1 Version A

1. Find the following derivatives:

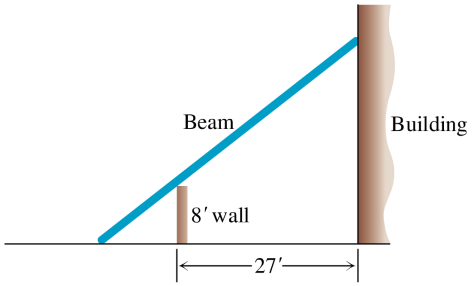
(i) $\dfrac{d}{dx}\arctan(1+x^2)$

(ii) $\dfrac{d}{dx}\dfrac{x^2}{3+\cos x}$

(iii) $\dfrac{d}{dx}\left|\sin(2x)\right|^3$

(iv) $\dfrac{d}{dx}(1+\sqrt{x})^x$

2. 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.

3. State the Mean Value Theorem for derivatives.

4. State the Fundamental Theorem of Calculus Part I.

5. State the Fundamental Theorem of Calculus Part II.

6. Explain how to use the trapezoidal rule to approximate $\int_a^b f(x)\,dx$.

7. Solve the following indefinite integrals:

(i) $\int (x^2 + x + 1)e^{-x}\, dx$

(ii) $\int \sin(2x)\cos(3x)\, dx$

(iii) $\int \frac{1}{x^2 + 2x + 5}\, dx$

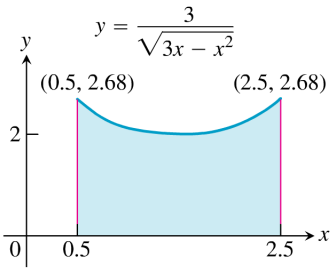
8. Solve the following definite integrals:

(i) $\displaystyle\int_0^2 |1 - x^2|\, dx$

(ii) $\displaystyle\int_0^2 \sqrt{4 - x^2}\, dx$

(iii) $\displaystyle\int_0^1 \log(5x + 7)\, dx$

9. Find the volume generated by revolving the shaded region about the x-axis.



10. Find the length of the curve given by $y = \ln(\cos x)$ between $x = 0$ and $x = \pi/3$.

11. Let $f(x) = 1/x$ and find the maximum of $|f''(x)|$ on the interval $[1, 2]$.

12. Consider approximating $\displaystyle\int_1^2 \frac{1}{x}\,dx$ using the trapezoid method. Use the bound

$$|E_T| \leq \frac{M(b-a)^3}{12n^2}$$

to determine a value for n which guarantees the error would be less than 10^{-4} but do not actually compute the approximation.