

Math 130 Exam 3 Sample 1 Framework

1. Find $f'(x)$. This is undefined when $x = 0$ and equals 0 when $x = 8$. Plug all of $x = 0, -1, 8$ into $f(x)$ and choose the largest and smallest results.
2. The cost is $40L + 20W$ and we have $LW = 1000$. Since $W = 1000/L$ we rewrite the cost as $C(L) = 40L + 20(1000/L) = 40L + 20000/L$ for $L > 0$. Take the derivative you'll find one L where the derivative is 0. Draw a number-line sign-chart for $C'(L)$ to see that this L yields a minimum cost. Also find W .
3. (a) Differentiate implicitly with respect to x , treating y as a function of x . Solve for $\frac{dy}{dx}$.
(b) Draw a picture and you should see similar triangles. If x is the distance from the man to the light and if s is the height of the shadow then similar triangles should give you $\frac{x}{6} = \frac{50}{s}$. Cross multiply and then differentiate with respect to t . You know $\frac{dx}{dt}$ and you want $\frac{ds}{dt}$. You know $x = 10$.
4. (a) Straightforward.
(b) FOIL first - there's no product rule for integrals.
(c) Put each part of the numerator over x then simplify first.
(d) Straightforward - learn your rules!
5. (a) Let $u = -3x$ then $du = -3dx$ and $-\frac{1}{3}du = dx$.
(b) Let $u = 2x + 3$ then $du = 2dx$ so $\frac{1}{2}du = dx$. You'll also need $x = \frac{u-3}{2} = \frac{1}{2}(u-3)$. Plug it all in and simplify before integrating. You will also need to distribute before integrating.
(c) Integrate to get $P(t)$ and don't forget the $+C$. Use $P(0) = 100$ to find C so then you have $P(t)$. Then find $P(20)$.